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RESEARCH DEPARTMENT

U.H.F. field trials 1962/63: measurements of vision, chrominance and sound field strengths made in Channels 34 and 44 in the London area

RESEARCH REPORT No. T-133

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THE BRITISH BROADCASTING CORPORATION
ENGINEERING DIVISION

RESEARCH DEPARTMENT

U.H.F. FIELD TRIALS 1962/63: MEASUREMENTS OF VISION, CHROMINANCE AND SOUND FIELD STRENGTHS MADE IN CHANNELS 34 AND 44 IN THE LONDON AREA

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SUMMARY

Statistical information is given concerning the ratios of the vision, sound and chrominance field strengths of colour television signals radiated in Channels 34 and 44. This information is based on measurements made by mobile laboratories in the London area during the 1962/63 U.H.F. Field Trials.

1. INTRODUCTION

The 1962/63 series of U.H.F. Field Trials have been described in detail elsewhere.[1,2,3] In addition to making subjective assessments of the displayed pictures, the mobile laboratories taking part in the Trials recorded objective measurements. The survey was carried out mainly in areas of poor reception and, at each site visited by a mobile laboratory, measurements were made of the vision, sound and chrominance field strengths of Channels 34 and 44. The results of the measurements are summarised, in this report, in a form which gives information regarding two aspects of u.h.f. propagation:

(i) The variation of field strength with frequency within a single u.h.f. channel.

(ii) The variation of the field strengths of two co-sited transmissions separated by ten channels.

2. MEASUREMENT TECHNIQUE

The measurements summarised in this report were made by the mobile laboratories of the Designs and Research Departments of the B.B.C. during the period February to June 1963. The equipment used in each laboratory was not specifically designed for the measurement of field strength; it consisted of a high-quality receiver whose video output was displayed by a waveform monitor. It also included meters that indicated sound carrier and peak vision-carrier levels. Both receiver installations were calibrated using the equipment of a standard field-strength measuring vehicle.

2.1. Measurement of Sound Field Strength

The sound field strength was measured by substituting the output of a standard signal generator for the signal provided by the receiving aerial, due allowance being made for the aerial gain and feeder loss.

2.2. Measurement of Vision Field Strength

The vision field strength measured was that corresponding to the tips of the synchronising pulses. (It should be remembered that the Field Trials in question related to 625-line television using negative vision modulation and frequency-modulated sound). The measurement was again made by substitution, using a standard signal generator; the receiver outputs obtained from the transmission and from the signal generator being compared directly on the waveform monitor.

2.3. Measurement of Chrominance Field Strength

Luminance and chrominance 'pulse-and-bar' test signals[4] were transmitted during the field-blanking intervals of the radiated signal, the transmitted magnitudes of the two 'bars' being equal. Direct observation of the received waveforms of the two test signals on a waveform monitor thus allowed the magnitude of the chrominance bar, relative to that of the luminance bar, to be measured.

3. RESULTS OF MEASUREMENTS

It should be noted that the measurements described in this report apply only to the London area; they are, however, thought to be representative of large areas of the United Kingdom.

The results of the field strength measurements made, have been analysed in terms of the percentage of locations at which a given value of field strength ratio is exceeded. The results of the analysis of the survey are summarised in Figs. 1 to 4 which provide the following information:

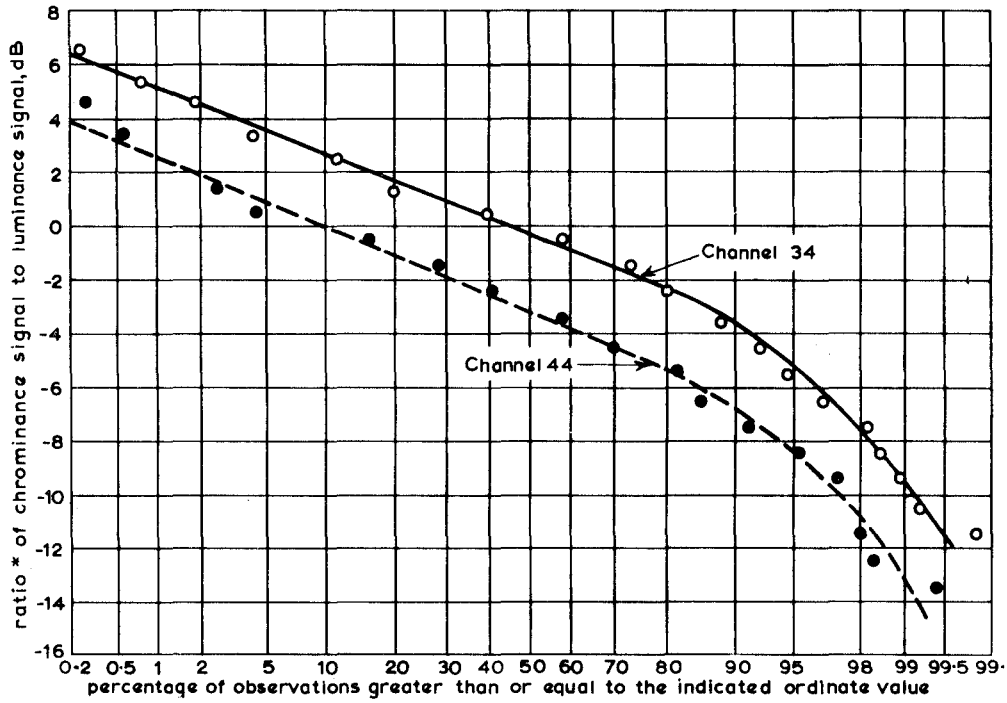
Fig. 1 shows the probability distribution of the ratio of chrominance-to-luminance field strengths for Channels 34 and 44.

Fig. 2 shows the probability distribution of the ratio of sound-to-vision field strengths for Channels 34 and 44.

Fig. 3 shows the probability distribution of the ratio of the vision field strength of Channel 34 to that of Channel 44, together with the corresponding distribution of the ratio of the sound field strengths for Channels 34 and 44.

Fig. 4 is derived from Fig. 1 and shows the distribution of the quantity formed by the ratio of the chrominance-to-luminance ratios for Channels 34 and 44.

It should be noted that the term vision field strength refers to the field strength of the complete transmitted signal, in terms of the carrier amplitude at the tips of the synchronising pulses. Chrominance field strength, however, refers to the magnitude of the chrominance bar relative to that of the luminance bar.



* 0 dB corresponds to the undistorted value

Fig. 1 - Ratio of chrominance to luminance signals for Channel 34 and Channel 44

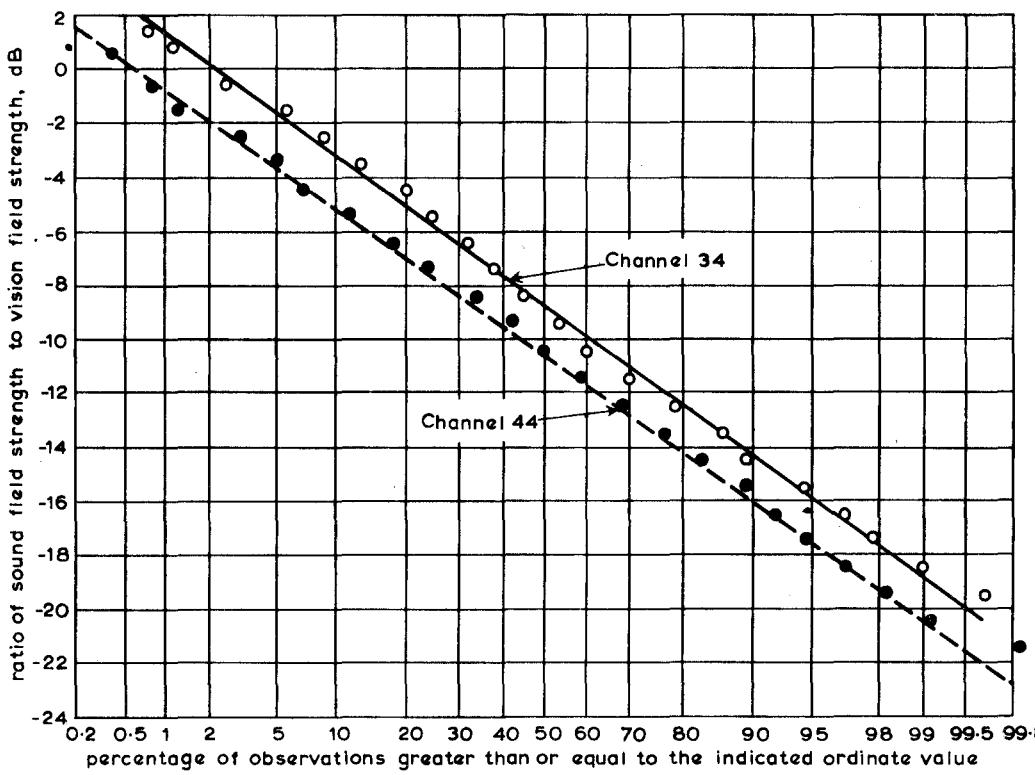


Fig. 2 - Ratio of sound to vision field strengths for Channel 34 and Channel 44

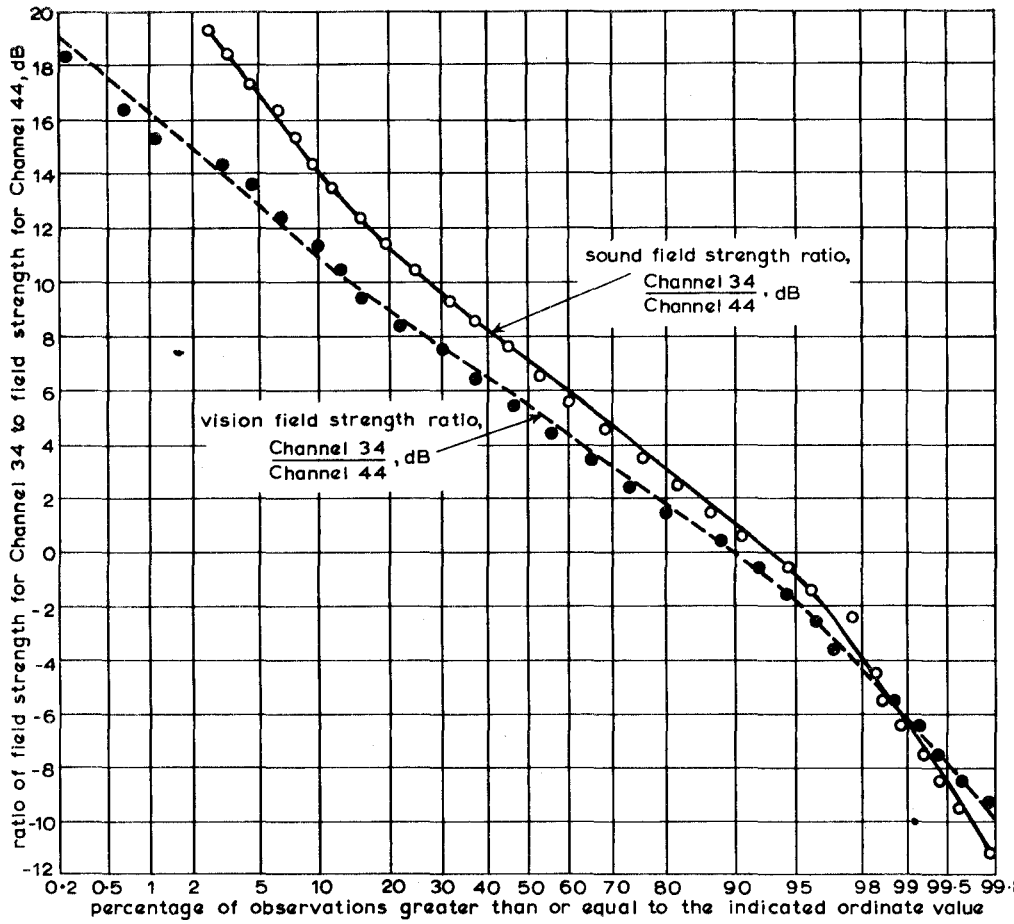


Fig. 3 - Vision field strength ratio and Sound field strength ratio of Channel 34 to Channel 44

4. DISCUSSION OF RESULTS

4.1. Ratio of Chrominance-to-Luminance Field Strengths

The distribution of the ratio of chrominance-to-luminance (Fig. 1) shows that the slopes of the curves corresponding to the two channels are very similar. The distribution thus appears to vary little with carrier frequency and the slopes of the curves of Fig. 1 are probably typical of a great part of the u.h.f. band. It will be noted that there is a displacement of approximately 3 dB between the curves corresponding to Channels 34 and 44, that of Channel 44 being the lower. This difference in the chrominance-to-luminance ratio for the two channels is due mainly to a change, with frequency, of vertical radiation pattern (v.r.p.) of the Channel 44 aerial. The Channel 44 aerial was of an 'end-fed' type and the angle of elevation of its main lobe increased with frequency, thus causing an attenuation of the chrominance signal relative to the luminance signal at the receiving aerial.

4.2. Ratio of Sound-to-Vision Field Strengths

The results shown in Fig. 2 confirm the conclusion, drawn from Fig. 1, that the distribution of field strength within a channel is independent of the channel

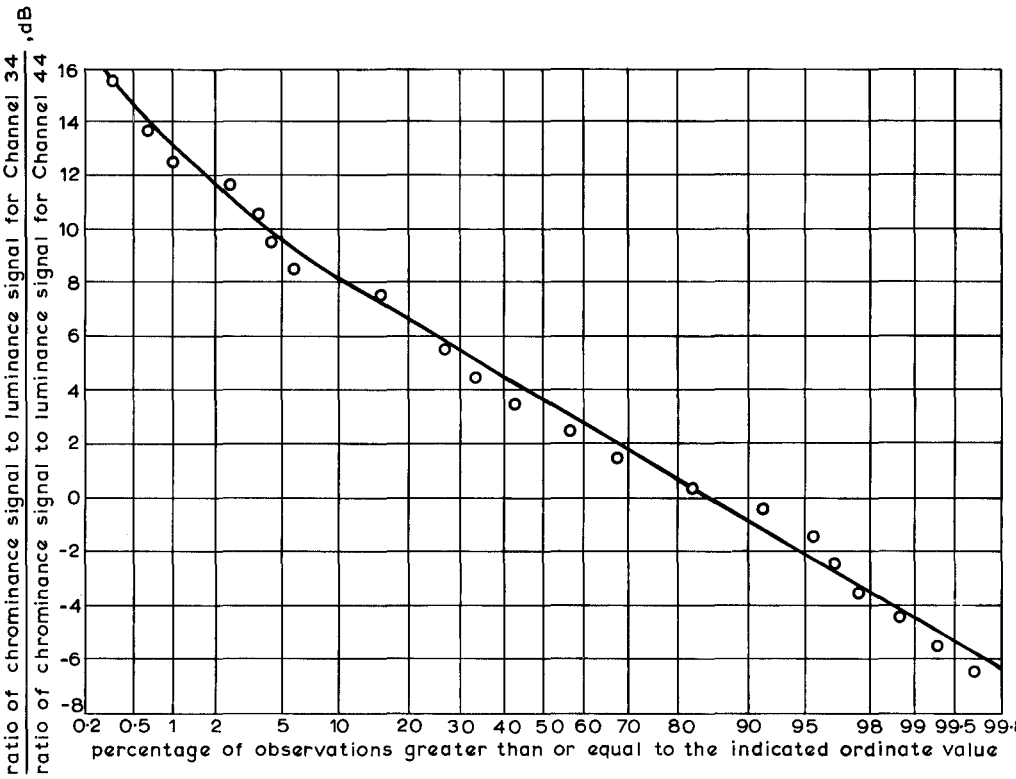


Fig. 4 - Ratio of the chrominance to luminance ratios for Channels 34 and 44

frequency. The ratio of sound-to-vision powers at the transmitter was –7 dB[5] and it would therefore be expected that the ordinate value for the two channels would approximate to this value for 50% of the observations. The curve corresponding to Channel 34 in Fig. 2 is approximately 1·5 dB lower than this value, which may be at least partly accounted for by the fact that the sound power of this channel was lower than the specified value during certain periods of the survey. The curve corresponding to Channel 44 is, however, approximately 3 dB lower than the expected value, which is mainly due to the change with frequency of the v.r.p. of the Channel 44 transmitting aerial mentioned in Section 4.1. There is no reason to suppose that propagation conditions will give rise to a departure of the median value from –7 dB.

4.3. Ratios of the Field Strengths of Channels 34 and 44

The two curves in Fig. 3 give information regarding the variation of field strength likely to be experienced by a viewer receiving two co-sited transmissions separated by ten channels and the results confirm measurements made by the standard field-strength measuring vehicle.[6] The curves do not pass through a value of 0 dB for a value of 50% on the abscissae because the mean effective radiated power (e.r.p.) and horizontal radiation pattern (h.r.p.) of the two channels differed. The relative displacement of the sound and vision curves is thought to be due to the change of v.r.p. of the Channel 44 aerial with frequency (referred to in Section 4.1. above).

4.4. Comparison between the Chrominance-to-Luminance Ratios of Channels 34 and 44

The comparison between the Chrominance-to-luminance ratios of the two channels shown in Fig. 4 is of interest since it gives an indication of the difficulties likely

to be experienced by the viewer when changing channels and is relevant to the design of colour television receivers. The change with frequency of the v.r.p. of the Channel 44 aerial results in a chrominance-to-luminance ratio which varies with distance from the transmitter. This variation is small over the range of distances used in the tests, however, and has a negligible effect on Fig. 4.

5. CONCLUSIONS

Measurements of the field strengths of the vision, sound and chrominance signals of Channels 34 and 44 have been made in the London area and the results have been plotted in the form of ratios which indicate the probable variation of field strength with frequency within a channel and between co-sited transmissions separated by ten channels. The information, although based on measurements made in the London area, is thought to apply to large areas of the United Kingdom.

6. REFERENCES

1. 'U.H.F. Field Trials 1962/63: A Comparison of the Effects of U.H.F. Propagation on NTSC, SECAM and PAL Signals', Research Department Technical Memorandum No. T-1060/1.

2. 'U.H.F. Field Trials 1962/63: A Comparison of the Reception of NTSC and SECAM when Transmitted in Two U.H.F. Channels', Research Department Technical Memorandum No. T-1060/2.

3. 'U.H.F. Field Trials 1962/63: A Comparison of the U.H.F. Propagation of NTSC, SECAM and PAL Signals using Domestic Receivers', Research Department Technical Memorandum No. T-1060/3.

4. Lewis, N.W.: 'Waveform Responses of Television Links', Proc.I.E.E., Paper No. 1688, July 1954 (*101*, III p. 258).

5. 'Specification of Monochrome and Colour Television Standards for 625-Line Experimental Transmissions', B.B.C. Engineering Division Monograph, March 1963.

6. 'Field Strength Comparisons of Channels 34 and 44 in the London Area,' Research Department Technical Memorandum No. K-1055.

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